

TITLE OF INVENTION

SYSTEM, METHOD, AND COMPUTER PROGRAM PRODUCT FOR END-USER
SERVICE PROVIDER SELECTION

CROSS REFERENCE TO RELATED PATENT DOCUMENTS

[0001] The present document claims the benefit of the earlier filing date of commonly owned, co-pending U.S. provisional patent application serial number 60/268,896, entitled "SYSTEM, METHOD, AND COMPUTER PROGRAM PRODUCT FOR END-USER SERVICE PROVIDER SELECTION," filed in the United States Patent and Trademark Office on February 16, 2001, the entire contents of which is incorporated herein by reference.

[0002] The present document contains subject matter related to that disclosed in commonly owned, co-pending: (1) Application Serial No. 09/784,074 filed February 16, 2001, entitled "SYSTEM, METHOD, AND COMPUTER PROGRAM PRODUCT FOR SUPPORTING MULTIPLE SERVICE PROVIDERS WITH AN INTEGRATED OPERATIONS SUPPORT SYSTEM" (Attorney Docket No. 200876US-8); (2) Application Serial No. 09/784,068 filed February 16, 2001, entitled "METHOD AND SYSTEM OF EXPANDING A CUSTOMER BASE OF A DATA SERVICES PROVIDER" (Attorney Docket No. 202385US-8); (3) Application Serial No. 09/784,075 filed February 16, 2001, entitled "SYSTEM, METHOD, AND COMPUTER PROGRAM PRODUCT FOR END-USER SELF-AUTHENTICATION" (Attorney Docket No. 202585US-8); (4) Application Serial No. 09/784,069 filed February 16, 2001, entitled "SYSTEM, METHOD, AND COMPUTER PROGRAM PRODUCT FOR SUPPORTING MULTIPLE SERVICE PROVIDERS WITH A TROUBLE TICKET CAPABILITY" (Attorney Docket No. 202586US-8); (5) Provisional Application Serial No. 60/268,871 filed February 16, 2001, entitled "SYSTEM, METHOD, AND COMPUTER PROGRAM PRODUCT FOR DYNAMIC BANDWIDTH QUALITY OF SERVICE (QOS)

PROVISIONING” (Attorney Docket No. 202661US-8 PROV); (6) Provisional Application Serial No. 60/268,870 filed February 16, 2001, entitled “SYSTEM, METHOD, AND COMPUTER PROGRAM PRODUCT FOR DYNAMIC BANDWIDTH PROVISIONING” (Attorney Docket No. 202663US-8 PROV); (7) Provisional Application Serial No. 60/268,865 filed February 16, 2001, entitled “SYSTEM, METHOD, AND COMPUTER PROGRAM PRODUCT FOR AN IRREVOCABLE RIGHT TO USE (IRU) MODEM REGISTRATION PROCESS” (Attorney Docket No. 203050US-8 PROV); (8) Application Serial No. XX/XXX,XXX, filed XXXXXX, entitled “SYSTEM, METHOD, AND COMPUTER PROGRAM PRODUCT FOR DYNAMIC BANDWIDTH QUALITY OF SERVICE (QOS) PROVISIONING” (Attorney Docket No. 214232US-8); (9) Application Serial No. XX/XXX,XXX, filed XXXXXXXX entitled “SYSTEM, METHOD, AND COMPUTER PROGRAM PRODUCT FOR AN IRREVOCABLE RIGHT TO USE (IRU) MODEM REGISTRATION PROCESS” (Attorney Docket No. 214242US-8); AND (10) Application Serial No. XX/XXX,XXX, filed XXXXXX entitled ‘SYSTEM, METHOD, AND COMPUTER PROGRAM PRODUCT FOR DYNAMIC BANDWIDTH PROVISIONING” (Attorney Docket No. 214442US-8), the entire contents of each of which being incorporated herein by reference.

BACKGROUND OF THE INVENTION

Field of the Invention

[0003] The present invention relates to a method, system and computer program product for supporting end-user service provider selection.

Discussion of the Background

[0004] Figure 1 is a block diagram of a conventional hybrid fiber optic/coaxial (HFC) network for providing cable television service and access to the Internet over the same cable television provider network. As shown in Figure 1, the fiber optic network, including both video content and data, is tapped via a tap 102 of a coaxial cable run from a fiber node 101. From the tap 102, a coaxial cable (i.e., a drop) is run to a splitter 103 where the signal is split into its data and cable television content components. The cable television content is run via a coaxial cable to a television set 104. The data portion of the signal is sent via a coaxial cable to a cable modem 105 connected to, for example, a personal computer 106.

[0005] In order to ensure interoperability and availability of parts, the devices used in this system comply with industry standards such as the Data Over Cable Service Interface Specification (DOCSIS). In a typical DOCSIS-compliant system, a network having 860 MHz of bandwidth will allocate the band of 5-42 MHz for upstream communications, and the band of 88-860 MHz for downstream communications.

[0006] The cable modem termination system (CMTS) 107 provides an interface between the cable network and the Internet. The CMTS 107 provides the data signal to the cable headend 108 which in turn provides connectivity to a backbone 109 provider. The backbone 109 provides the connectivity to the communications network 100, for example, the Internet. The backbone 109 is a network configured to provide access to the Internet. Access to the backbone 109 is provided by, for example, organizations such as UUNET.

[0007] The DOCSIS standard applies to all equipment between the cable modem 105 and the CMTS 107. Accordingly, DOCSIS defines a protocol through which existing cable networks may also be used to provide high-speed bidirectional Internet access.

[0008] Figure 2 is a block diagram showing a conventional dial-up network configuration for providing access to the Internet via an existing telephone network. As shown in Figure 2, an end-user may connect to the network via a personal computer 201 having, for example, a digital subscriber line (DSL) modem 200. The DSL modem 200 interfaces with the telephone network through a digital subscriber line access multiplexer (DSLAM) 202. Similar to the CMTS 107 shown in Figure 1, the DSLAM 202 is connected to a backbone 109 through a headend 203. The backbone 109, which may be the same backbone 109 shown in Figure 1, provides connectivity to the Internet 100.

[0009] DSL technology allows digital data to coexist with analog voice data over plain old telephone service (POTS) copper wire networks. As DOCSIS enables the use of existing cable networks for Internet access, technologies such as DSL enable the use of existing telephone networks for Internet access.

[0010] As the Internet has become a ubiquitous facet of our society, it is understandable that technologies such as DSL and DOCSIS have well-positioned the telephone companies and the cable television (CATV) companies to benefit. The phone companies and the CATV companies had preexisting networks in place providing connectivity to a large percentage of commercial facilities and residences which desire Internet access. As the technologies evolved permitting multiple uses for the preexisting networks, the telephone companies and cable television providers were able to provide additional services to their existing customer base.

[0011] New businesses have also developed in response to the demand for Internet access. For example, Roadrunner's business model is to provide high-speed broadband Internet access services to end-users. They do this by entering into agreements with existing CATV companies so as to gain access to the preexisting CATV HFC network. By owning their own

headend, they can provide Internet access to end-users by providing connectivity, through their headend, from the CMTS 107 to the backbone 109.

[0012] Other Internet service providers (ISPs) make use of the preexisting telephone system network to gain access to end-users. Similar to the Roadrunner model, these ISPs own their own headend, and provide Internet access to end-users by providing connectivity, through their headend, from the DSLAM 202 to the backbone 109. The existing network owners (i.e., the CATV companies and the telephone companies) have developed systems for provisioning new customers, monitoring network status, and for generating billing for network usage. However, these systems have been evolutionary and have not been developed as a single system, but rather, a collection of separate systems, each having their own interfaces and databases. This has led to significant challenges in maintaining data integrity across the systems, and has also impacted user productivity. Not only do the network owners have to deal with these complexities and inefficiencies, but also, the ISPs connecting to these networks must develop interfaces, oftentimes manual interfaces, between the ISP's internal systems and the network owner's systems. This problem is even worse for an ISP such as Roadrunner which has agreements with many CATV companies, each of which has its own heterogeneous system. It becomes increasingly difficult for an ISP to manage its own systems each time an agreement with a new CATV company or a new telephone company having different systems is reached.

[0013] As a general statement, ISPs provide the service of connecting end-users to the Internet by entering into agreements with the owners of the existing networks (i.e., the telephone network and CATV networks), and with the providers of the backbone 109 networks (e.g., UUNET). ISPs typically provide a number of services for their customers, for example, e-mail, news, software downloads, etc. Moreover, ISPs provide a single point of

contact for an end-user, alleviating the need for each end-user to interact with the network owner and/or the backbone 109 provider regarding their Internet connectivity.

SUMMARY OF THE INVENTION

[0014] The inventors of the present invention have recognized that currently no methods, systems, or computer program products are available to allow end-users to select service providers in an open access network for providing broadband data transport services. The broadband data transport services provided in the context of the present invention may include, but are not limited to any combination of analog video, digital video, data services, Internet access, packetized voice, voice-over-Internet Protocol, interactive video, interactive television, near video-on-demand, video-on-demand, data services, and telephony services. Accordingly, one object of the present invention is to provide a solution to this problem, as well as other problems and deficiencies associated with selecting service providers in an open access network for providing broadband data transport services.

[0015] The above described and other objects are addressed by the present invention which provides a novel computer-implemented method, system and computer program product for end-user service provider selection in a network supporting one or more service providers connected to the network, including prompting an end-user for end-user information including a geographic location of the user; determining based on the end-user information whether the network provides service in the geographic location; displaying to the end-user a list of one or more service providers available to the end-user and supported by the network; providing means for contacting the one or more service providers available to the end-user; receiving service information from a service provider selected by the end-user from the list of the one or more service providers based on the means for contacting the one or more service

providers; and providing service via the selected service provider on the network to the end-user based on the received service information.

[0016] Consistent with the title of this section, the above summary is not intended to be an exhaustive discussion of all the features or embodiments of the present invention. A more complete, although not necessarily exhaustive, description of the features and embodiments of the invention is found in the section entitled "DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS."

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] A more complete appreciation of the present invention and many of the attendant advantages thereof will be readily obtained as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings, wherein:

[0018] Figure 1 is a block diagram of a typical system configuration of a hybrid fiber optic/coaxial (HFC) network for providing cable television service and access to the Internet through the cable television provider network;

[0019] Figure 2 is a block diagram of a typical dial-up network providing access to the Internet over phone lines;

[0020] Figure 3 is a block diagram of a high-speed network system for providing broadband transport data services (e.g., connecting to an ISP headend to gain access to the Internet) connected to a conventional HFC network providing both cable television and access to a communications network according to one embodiment of the present invention;

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[0021] Figure 4 is a block diagram showing the connectivity of multiple hybrid fiber optic/coaxial networks through a single data center of a high-speed network according to one embodiment of the present invention;

[0022] Figure 5 is a block diagram showing the connectivity of remote end-users to geographically based service providers (e.g., an Internet service provider (ISP)) through a high-speed network in one embodiment of the present invention;

[0023] Figure 6 is block diagram showing the connectivity between a common data center of a high-speed network as shown in Figure 4 and a service provider's (e.g., an ISP) system according to one embodiment of the present invention;

[0024] Figure 7 is a block diagram of a system configuration of an operations support system of a high-speed network to support multiple service providers according to one embodiment of the present invention;

[0025] Figure 8 is a block diagram showing the software architecture of a system for an integrated operations support system of a high-speed network to support multiple service providers according to one embodiment of the present invention;

[0026] Figure 9 shows an exemplary database structure for a database of an operations support system of a high-speed network supporting multiple service providers (e.g., ISPs) according to one embodiment of the present invention;

[0027] Figures 10A-10E are flow diagrams showing exemplary processes for end-user Internet service provider (ISP) selection according to various embodiments of the present invention; and

[0028] Figure 11 is an exemplary computer system programmed to perform one or more of the special purpose functions of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0029] Referring now to the drawings, wherein like reference numerals designate identical or corresponding parts throughout the several views, and more particularly to Figure 3 thereof, which is a block diagram of a system for providing broadband data services, including access to a communications network (e.g., the Internet) according to one embodiment of the present invention. The system includes a high-speed network 300 for providing broadband data transport services. In one embodiment of the present invention, the high-speed network 300 provides end-users with connectivity to an Internet service provider (ISP) headend 307 to gain access to a communications network 100, for example, the Internet. This connectivity may be provided by using the Data Over Cable Service Interface Specification (DOCSIS) protocol for communications between the end-user cable modem 305 and the cable modem termination system (CMTS) 302 of the high-speed network 300. In further embodiments, protocols other than DOCSIS may be used (e.g., Euro-DOCSIS, fast Ethernet, gigabit Ethernet or other proprietary protocols). In another embodiment, the high-speed network 300 provides end-users with connectivity to an Internet backbone network directly (i.e., via the data center 301) on behalf of the ISP. In further embodiments, the broadband data transport services provided in the context of the present invention may include, but are not limited to any combination of analog video, digital video, data services, Internet access, packetized voice, voice-over-Internet Protocol, interactive video, interactive television, near video-on-demand, video-on-demand, data services, and telephony services. The embodiments described herein will be in the context of providing high-speed access to the Internet by providing end-users with connectivity to ISP headends 307. However, as discussed above, the invention is not limited to this particular embodiment nor is it limited to providing access to any particular network.

[0030] The high-speed network 300 is a hybrid fiber optic/coaxial (HFC) network similar to existing cable television (CATV) plants. The high-speed network 300 provides connectivity from end-users, for example, through a personal computer 306 having a cable modem 305, through a coaxial cable to a tap 304 of the fiber optic network. The tap 304 connects the end-user to the coaxial cable portion of the HFC network that connects to the fiber optic network at a node 303. The cable modem 305 communicates with the cable modem termination system (CMTS) 302, which in turn provides connectivity for all end-users of the high-speed network 300 to a common data center 301.

[0031] The data center 301 provides connectivity from the high-speed network to an Internet service provider's (ISP) headend 307. The ISP headend 307 is the same headend as described in the BACKGROUND OF THE INVENTION section. For example, the ISP headend 307 may be a cable headend 108 of an ISP providing Internet access over an existing cable network, or it may be a headend 203 of an ISP providing Internet access through dialup connections. In one embodiment of the present invention, the high-speed network 300 provides connectivity to a plurality of ISP headends 307. For example, the end-users from CATV operator ISPs and dial-up ISPs coexist on the same high-speed network 300. The data center 301 is responsible for managing the connectivity between the various ISPs and their particular end-user customers. The ISP headend 307 provides the connectivity to the backbone 109, as described above, which in turn provides the connectivity to the communications network 100, for example, the Internet. Various approaches for connecting to the Internet, including DSL and cable modem connections, are described in White, R., "How Computers Work," Que, September 1999, and Gralla, P. "How the Internet Works," Que, August 1999, the entire contents of both of which are incorporated herein by reference.

0032] Figure 3 illustrates two different networks for gaining access to the Internet 100 through a common ISP headend 307. As discussed above, one path is through the high-speed network 300 for providing broadband data transport services. The other is a preexisting CATV network that provides both cable television content and Internet access. The cable television signal is separated from the data signal at the splitter 103, the cable television signal is provided to a television 104, while the data signal is provided to a cable modem 105 connected to a personal computer 106. The splitter 103 is connected via a coaxial cable to the tap 102. The tap 102 connects the end-user to the coaxial cable portion of the HFC network that in turn connects to the fiber optic network at the fiber node 101. The cable modem termination system (CMTS) 107 communicates with the cable modem 105 and provides connectivity to the common ISP headend 307.

0033] The inventors of the present invention have recognized that by providing a high-speed network 300 that is dedicated to particular broadband data transport services, as compared to sharing a preexisting network built for cable television or telephone use, significant improvements in performance may be achieved. For example, some embodiments of the present invention are directed to a high-speed network 300 that is dedicated to providing data services only, for example, Internet access. In these embodiments, the bandwidth of the network can be fully dedicated to that service thereby improving the performance. Other embodiments of the present invention, as described above, are directed to a high-speed network 300 that has not been dedicated to providing a particular service, but rather, provides multiple services. A significant portion of the bandwidth of preexisting CATV networks is dedicated to the downstream transmission of the cable television video. For example, a seventy-channel analog video system requires 420 MHz of bandwidth (6 MHz per channel). Accordingly, standards have been developed to work around that limitation.

For example, the Data Over Cable Service Interface Specification (DOCSIS) standard provides that, for an 860 MHz bandwidth channel, the band from 88 MHz to 860 MHz would be reserved for downstream communications. Consequently, devices built for use in a data over cable system must limit their upstream bandwidth to the first 42 MHz. Such allocation limitations do not exist where the high-speed network 300 is dedicated to providing a particular broadband data transport services.

[0034] Figure 3 provides an example showing an ISP headend 307 for a cable provider that also provides Internet access over their cable network. However, this is an exemplary illustration only. The ISP headend 307 could also be a headend 203 for an ISP providing Internet access over telephone lines, as shown in Figure 2. Alternatively, the ISP headend 307 could be a headend for an Internet service provider such as Roadrunner that provides Internet access through affiliations with various owners of preexisting networks. Moreover, multiple ISP headends 307, of varying types, may be connected to the high-speed network 300 for providing broadband data services.

[0035] Figure 3 illustrates that, in one embodiment of the present invention, an ISP may have connectivity to some customers (i.e., end-users) connected to the ISP headend 307 through its own network, for example, the personal computer 106 connected to the ISP headend 307 through the CMTS 107. In addition, that same ISP may have customers connected to a different, high-speed network 300 for providing broadband data transport services, for example, the personal computer 306 connected to the data center 301 through the CMTS 302. Accordingly, Figure 3 illustrates that, in one embodiment of the present invention, an ISP may provide services to end-users connected to different networks. In this embodiment, the ISP maintains the relationship with the end-users. If the ISP owns their own network (e.g., a cable television operator) they are responsible for that physical plant as well.

If, on the other hand, the ISP does not operate a network (e.g., the Roadrunner example discussed above, where the ISP enters into agreements with the network operators), the ISP must coordinate with the operators of the networks concerning network status, outages, etc. The operator of the high-speed network 300 is responsible for the operation of that plant, and network status information is made available to those ISPs having customers connected to the high-speed network 300.

[0036] As discussed above, the present inventors have recognized that Internet connectivity through a high-speed network 300 dedicated to broadband data transport services provides superior performance over conventional approaches. Accordingly, using the system configuration shown in Figure 3, an ISP could offer enhanced performance to its customers through providing Internet connectivity via the high-speed network 300 dedicated to providing Internet access, rather than via the preexisting cable television network. Moreover, the present inventors have recognized that by providing a high-speed network 300 based on an open access model, many ISPs can expand their customer base by being able to offer their services in geographic regions not currently served, and moreover, ISPs may offer upgraded performance to new and existing customers by connecting those customers to the high-speed network 300 dedicated to broadband data transport services. Because the high-speed network 300 is dedicated to that particular broadband data service. In those embodiments where the high-speed network 300 is dedicated to, for example, Internet access, the high-speed network 300 will be able to support new network technologies that may either coexist with or replace standards that have been developed to accommodate certain limitations (e.g., the DOCSIS standard assumes the presence of analog cable television on the network).

[0037] Figure 4 is a block diagram showing the connectivity of multiple HFC networks through a single data center 301 highlighting another aspect of the present invention. As

shown in Figure 4, the high-speed network simplified as box 300 in Figure 3 may include several HFC networks 400 that may be geographically dispersed. Each of the HFC networks includes one or more fiber optic nodes 401 that provide connectivity between the fiber optic portion of the network and the coaxial cable portion of the network. For example, each fiber optic node 401 may have connected thereto several end-users 402 via a coaxial cable network. Each end-user 402 is connected to the network, for example, through a cable modem 305. Each of the fiber optic networks 400 is connected to the common data center 301 via a CMTS 403. The common data center 301 provides the connectivity between the geographically dispersed end-users 402 and the various ISP headends 307 having customers on the high-speed network 300.

[0038] It was the present inventors who recognized that a limitation faced by cable television providers also providing Internet access was that the CATV network was necessarily limited by the geographic restrictions of the franchise agreements awarded to the cable companies. Accordingly, the reach of a cable company extended only to those end-users within the geographic boundaries of the cable company franchise award. The present inventors recognized that by not tying broadband Internet access services to an HFC system primarily dedicated to carrying analog video signals required by a CATV franchise award, the high-speed network 300 would not be subject to franchise-based geographic restrictions. Accordingly, in those situations, not only will the high-speed network 300 provide superior performance, but also, it may be built-out based on demand, and not subject to regulatory restrictions faced by cable television providers.

[0039] The availability of a high-speed network 300 that is not geographically restricted, provides an opportunity for existing ISPs (whether or not they operate their own network) to offer their services beyond the geographic limits of their franchise award or agreements with

existing network owners. Connectivity between the ISP headend 307 and the common data center 301 provides connectivity between the ISP and the end-users connected to the high-speed network 300 dedicated to broadband data transport services, regardless of the geographic location of those end-users.

[0040] Figure 5 is a block diagram showing the connectivity of remote customers to geographically based service providers (e.g., ISPs) via the common data center 301 according to one embodiment of the present invention. As shown in Figure 5, various geographically dispersed HFC networks 501 are connected to a common data center 301. Each of the HFC networks 501 is a high-speed network 300 for providing broadband data transport services. In the exemplary embodiment shown in Figure 5, the high-speed network 300 is not geographically restricted by, for example, a cable television franchise agreement. As would be understood by those of ordinary skill in the network art, the present invention is equally applicable to other embodiments.

[0041] Also shown in Figure 5 are three exemplary ISP headends 502, 504, 506 representing three ISPs providing connectivity to the Internet 100 via different backbones 503, 505, 507. For example, the ISP 1 headend 502 is connected to the Internet 100 via backbone 1 503 which is based in, for example, Connecticut. In this example, ISP 1 has the cable television franchise for the entire state of Connecticut. Using the system of the present invention, however, ISP 1 would be able to provide ISP services to end-users connected to any one of the HFC networks 501 having connectivity to the common data center 301. Accordingly, ISP 1's Internet access business is no longer restricted to the geographic boundaries of their CATV franchise award.

[0042] The common data center 301 of the present invention serves as a clearinghouse for bringing end-users to ISPs. In those embodiments of the present invention where the high-

speed network is not geographically restricted, such as the example described above in the context of Figure 5, the end-users may be from any geographic area served by the high-speed network 300 for providing broadband data transport services. Those customers may or may not be within the geographic boundaries of existing cable television franchise agreements. The ISPs, on the other hand, need not be existing cable television operators. The common data center 301 provides connectivity to end-users for multiple ISPs. The present inventors have recognized that by providing a high-speed network 300 dedicated to broadband data transport services, ISPs gaining access to the high-speed network 300 will be able to (1) offer their customers enhanced Internet access performance since the high-speed network 300 does not have to reserve bandwidth for video (i.e., cable television content), and (2) have the option of extending the geographic reaches of their business.

[0043] Figure 6 is a block diagram showing the connectivity between a common data center 301 and an ISP headend 600 according to one embodiment of the present invention. Again, the ISP headend 600 may be for an ISP either having their own network, or an ISP having agreements with network operators (e.g., CATV operators or telephone companies). Both the ISP headend 600 and the common data center 301 provide certain services, such as, for example, Dynamic Host Configuration Protocol (DHCP) services, Lightweight Directory Access Protocol (LDAP) services (typically, but not necessarily integrated with DHCP), Trivial File Transfer Protocol (TFTP) services, Time Of Day (TOD) services, and system logging (SYSLOG) services in order to provide fundamental services to their networks. In one embodiment of the present invention, the ISP headend 600 is further responsible for providing the typical ISP information services provided to the ISP's customers (i.e., the end-users) including, but not limited to e-mail service, news, and software downloads.

0044 The common data center 301 is responsible for managing the high-speed network 300 plant, as well as the interfaces with the various ISPs having customers connected to the high-speed network 300 for providing broadband data transport services. While the common data center 301 is responsible for providing services related to the physical aspects of the high-speed network 300 (e.g., network availability, asset management, etc.), the individual ISPs connected to the common data center 301 are each responsible for interfacing with their customers. The common data center 301 provides a single integrated operations support system (OSS) 601 through which the physical aspects of the high-speed network 300 may be managed, and through which the individual ISPs having customers connected to the high-speed network 300 may manage their relationship with the operator of the high-speed network 300 for providing broadband data transport services. In one embodiment of the present invention, the operations support system 601 includes a billing capability, a provisioning capability, a general ledger and accounts payable system, a trouble ticketing capability, network monitoring capabilities, service availability capabilities, asset management capabilities, and workforce management capabilities. As would be understood by one of ordinary skill in the software art in light of the present specification, further embodiments of the present invention may include various combinations or sub-combinations of the above-described functional capabilities, or even include additional capabilities including, but not limited to, data warehousing and data mining capabilities. In addition, further embodiments of the present invention may include a common data center 301 in which some of the functional capabilities are housed at physically diverse locations with logical connectivity between the functional capabilities. In other words, the common data center 301 may be a logical common data center and may not be housed in a common physical building.

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[0045] Figure 7 is a block diagram of a system configuration of an operations support system (OSS) 601 of a common data center 301 as shown in Figure 6 according to one embodiment of the present invention. As shown in Figure 7, the system includes a maintenance workstation 700, one or more customer workstations 701 (to provide connectivity for each of the customer ISPs), a communications network 100 (e.g., the Internet), a web server 702, an applications server 703, a database server 704, and an operations support system database 705.

[0046] The operations support system database 705 is a digital repository that may be implemented, for example, through a commercially available relational database management system (RDBMS) based on the structured query language (SQL) such as ORACLE, DB2, SYBASE, INFORMIX, or MICROSOFT SQL SERVER, through an object-oriented database management system (ODBMS), or through custom database management software. In one embodiment of the present invention, the operations support system database 705 includes information related to both the physical and usage aspects of the high-speed network 300.

[0047] For example, the operations support system database 705 includes information related to the plant of the high-speed network 300, including, but not limited to, the geographic availability of the network 300 (i.e., where the high-speed network 300 has been built-out), asset management information, workforce management information including work order status information, trouble ticket information, and network event information. The operations support system database 705 also includes information needed by ISPs having customers on the high-speed network 300. In this regard, as an ISP puts one of their customers onto the high-speed network 300, that ISP becomes a customer of the operator of the high-speed network 300. The operations system support database 705, therefore, includes information such as provisioning information, billing information, general ledger

information, and accounts payable information that supports the relationship between the operator of the high-speed network 300 and the ISPs having customers connected to the high-speed network 300.

[0048] Processes running on the database server 704 maintain the information in the operations support system database 705. The database server 704 is implemented using the computer system 1501 of Figure 11, for example, but also may be any other suitable personal computer (PC), workstation, server, or device for maintaining the information in the operations support system database 705. The operations support system database 705 may reside on a storage device of the database server 704, or reside on another device connected to the database server 704, for example, by way of a local area network, or other communications link such as a virtual private network, wireless link, or Internet-enabled link.

[0049] The applications server 703 may be implemented using the computer system 1501 of Figure 11, for example, or any other suitable PC, workstation, server, or other device for hosting applications that are used to maintain the various types of information stored in the operations support system database 705. Applications running on the applications server 703 interact with the information held in the operations support system database 705 through the database server 704.

[0050] The web server 702 may be implemented using the computer system 1501 of Figure 11, for example, or any other suitable PC, workstation, server, or other device for hosting an interface through which users may interact with applications running on the applications server 703. In one embodiment of the present invention, the user interface provided by the web server 702 is a world wide web interface accessible through the communications network 100 (e.g., the Internet) via commercially available web browser tools including, but not limited to, INTERNET EXPLORER, available from Microsoft Corporation and

NETSCAPE NAVIGATOR, available from Netscape Communications Corporation. The commercially available web browser tool running on the maintenance workstation 700 or the customer workstation 701 provides accessibility to the applications running on the applications server 703 through the web interface provided by the web server 702.

[0051] The maintenance workstation 700 may be implemented using the computer system 1501 of Figure 11, for example, or any other suitable PC, workstation, personal data assistant (PDA), server, or other device for accessing the data in the operations support system database 705 via applications running on the application server 703 through the web based interface provided by the web server 702. In one embodiment, internal personnel may gain access to information in the operations support system database 705 and the applications running on the application server 703 directly (i.e., without going through a common web portal). This direct-access capability is restricted to authorized personnel only. As discussed above, the maintenance workstation 700 may gain access to the web-based interface through a commercially available browser. In one embodiment of the present invention, the maintenance workstation 700 is used to access that information in the operations support system database 705 related to the management of the physical aspects of the high-speed network 300 itself. For example, the maintenance workstation 700 is used to access information relating to network status, trouble ticket status, or work order status. The maintenance workstation 700 is also used for maintaining the operations support system database 705 and the applications running on the application server 703.

[0052] The customer workstation 701 may be implemented using the computer system 1501 of Figure 11, for example, or any other suitable PC, workstation, PDA, server, or other device for accessing information stored in the operations support system database via applications running on the application server 703 through the web based interface provided

by the web server 702. As discussed above, the customer workstation 701 may gain access to those applications via a commercially available browser. In one embodiment, the customer workstation 701 is used by ISPs having customers (i.e., end-users) connected to the high-speed network 300. The customer workstation 701 accesses billing information concerning their particular customers, however, ISPs accessing the OSS 601 are restricted from accessing information related to other customers (i.e., other ISPs), nor can they access network management-type information.

[0053] In one embodiment of the present invention, strong authentication, authorization and communications integrity are provided for both internal and customer access to the OSS 601. Security may be accomplished through a variety of techniques. For example, security may be imposed at the network level by only accepting traffic from a predetermined set of IP addresses, and by encrypting all data traffic flows using an appropriate technology, such as, for example, Secure Shell (SSH) and Secure HTTP (S-HTTP). User authentication may be performed by using appropriate technologies including, but not limited to, username/password pairs, and one-time password technologies such as SecureID.

[0054] The inventors of the present invention have recognized that by providing a single, integrated operations support system (OSS), multiple ISPs can be supported in a secure and authenticated fashion. Internal personnel responsible for the operation of the OSS maintain a single system with which all of their ISP customers interact. By having a single system, only one interface is needed to perform each of the functions supported for the OSS. By not having custom systems or interfaces for each ISP customer, the complexity of the system is decreased, and the reliability of the system is increased, both of which will reduce the cost of maintaining the OSS.

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[0055] The inventors of the present invention have also recognized that by developing an integrated OSS to have modular architecture and a common database supporting the functions provided by the OSS, components are easily replaced and functionality is easily added or modified. Furthermore, the present inventors have recognized that it is advantageous to have a common web portal for accessing the OSS since the users of the OSS, in particular the ISP customer users, need not develop any software to gain access to the functionality provided. Accordingly, new customers need only have a web browser in order to gain access to the functionality provided by the OSS.

[0056] Figure 8 is a block diagram showing the software architecture of an integrated operations support system (OSS) 601 to support multiple customers (e.g., ISPs) and end-users of the high-speed network 300 according to one embodiment of the present invention. As shown in Figure 8, the architecture provides a single web portal 802 for all users of the OSS 601. In other words, both internal personnel 800 (i.e., those personnel responsible for the operation of the high-speed network 300), customers 801 (e.g., ISPs having end-users 811 connected to the high-speed network 300) and end-users 811 access the OSS 601 through a single web-based interface, or web portal 802. The web portal 802 provides a single point of access to a variety of software applications through which information in the operations support system database 705 is manipulated. In one embodiment of the present invention, internal personnel 800 may bypass the web portal 802 to gain access to the applications provided by the OSS 601. In this embodiment, as discussed above, this access is restricted to authorized internal personnel 800 only.

[0057] In one embodiment of the present invention, the look and feel of the user interface of the web portal 802 is customizable to facilitate integration with established ISP business processes. In one embodiment, the user interface is branded with the logo of the ISP

customer. In a further embodiment, sales scripting language (prompts) defined by the ISP may be used through the user interface. In yet another embodiment, the ISP may be given the ability to control account management functions to control which ISP personnel may have access to the OSS 601 via the web portal 802. Any such desired customizations may be provided on a per-customer basis.

[0058] In another embodiment of the present invention the web-based user interface is complemented with automated interfaces for certain functional components, for example, billing and provisioning. Having these automated interfaces results in increased system scalability and ISP process efficiencies. These interfaces may be implemented as, for example, an extensible markup language (XML) interface, a file transfer protocol (FTP) interface, an electronic data interchange (EDI) interface, an interface using the rsync Internet protocol, or an electronic mail (e-mail) interface. In another embodiment of the present invention, OSS 601 functionality is accessible through an application programmer's interface (API).

[0059] In one embodiment of the present invention, the operations support system database 705 is implemented as a single master ORACLE relational database providing a single common repository accessed by all applications, whether those applications are supporting internal functions for internal personnel 800, or customer functions supporting customers 801. Further embodiments of the present invention use multiple database instances specific to a particular functionality (e.g., billing, provisioning, network monitoring, etc.), each of which is coordinated through a single master database.

[0060] In one embodiment of the present invention, customers 801 interact with the web portal 802 via a customer workstation 701, internal personnel 800 interact with the web portal 802 through a maintenance workstation 700 and end-users 811 interact with the web portal

802 through personal computers 106, the web portal 802 is provided by the web server 702, the various applications are hosted by the applications server 703, and the operations support system database 705 is managed by the database server 704.

[0061] As shown in Figure 8, in one embodiment of the present invention, the operations support system 601 includes a workforce management application 803, a general ledger and accounts payable application 804, a billing application 805, a service availability application 806, an asset management application 807, a network monitoring application 808, a trouble ticket application 809, and a provisioning application 810. As discussed above, all of the various software applications are accessible via the common web portal 802 and store and retrieve information from the common operations support system database 705. Of course, the applications included in the OSS 601 may vary with different embodiments of the present invention. The OSS 601 provides an integrated system for managing the high-speed network 300 plant as well as its usage.

[0062] As recognized by the present inventors, it is advantageous to provide access to the various applications required to manage the high-speed network 300 itself, as well as its usage, through a common web portal 802 such that customers 801, internal personnel 800 and end-users 811 may access the information stored in the operations support system database 705 by simply having access to a commercially available browser. In other words, no customer software is required by either the operators of the network (i.e., internal personnel 800), the customers 801 (e.g., ISPs) of the network or the end-users 811. Furthermore, the present inventors have recognized that by storing all information in a common operations support system database 705, having a common data model, the sharing of information between the various applications will be facilitated. Moreover, the integrity of the information stored in the operations support system database 705 will be maximized. The

present inventors have recognized that it is advantageous, from both a technical and business perspective, to have an integrated OSS 601 based on a common operations support system database 705.

[0063] Figure 9 shows an exemplary database structure for an operations support system database 705 supporting multiple customers 801 (e.g., ISPs) according to one embodiment of the present invention. As shown in Figure 9, a single query of the operations support system database 705 produces a result 901 that may include several end-users 811 (i.e., individual connections to the high-speed network 300), each end-user 811 being a customer of a particular ISP, each of those ISPs being a customer 801 of the high-speed network 300. Each customer 801 of the high-speed network 300 (e.g., an ISP) may offer a variety of service plans to their customers (i.e., end-users 811). For example, a particular ISP may offer three different rate plans (e.g., customer plan A, customer plan B, customer plan C). Each of those rate plans would cause different billing information to be generated based on the customer plan subscribed to as defined in the billing application 805 for that particular end-user 811.

[0064] As customers 801 access information stored in the operations support system database 705, they are restricted from viewing any records other than those corresponding to end-users 811 which are their customers. For example, as shown in Figure 9, when customer ISP 1 accesses the operations support system database 705 via the web portal 802, ISP 1 will only have access to records relating to end-users 811 having IDs 1, 3, and 6, as those end-users 811 have a customer-provider relationship with ISP 1. Similarly, when customer ISP 2 accesses the operations support system database 705, ISP 2 will only have access to records pertaining to end-users 811 having IDs 2, 5, 7, and 8, and so on. The inventors of the present invention have recognized that from a technical and business perspective, that it is advantageous to store information relating to all of the customers 801 of the high-speed

network 300 in a common format in a common operations support system database 705. Accordingly, the operators of the high-speed network 300 need only provide a single user interface to the operations support system 601 that may be accessed by all customers 801. Moreover, the complexity of the operations support system database 705 is minimized, as are the various interfaces between the applications 803-809 and the operations support system database 705. The inventors of the present invention have further recognized that by maintaining information of interest to the operators of the high-speed network 300 and information of interest to the customers 801 in a common operations support system database 705 accessible through a single web portal 802, they have alleviated the need to have separate software applications providing interfaces between a variety of systems.

[0065] Figures 10A-10E are flow diagrams showing exemplary processes for end-user Internet service provider (ISP) selection according to various embodiments of the present invention. As shown in Figure 10A, an end-user ISP selection process begins at step S1001 where the OSS 601 presents, for example, a single web-based user interface to the end-user 811 which prompts the end-user 811 for end-user information, such as their geographic location (e.g., street name and number, city, state, zip code, etc). Such an end-user 811 web-based interface can be implemented as a separate interface or, through the single web portal 802. In the case of a separate end-user 811 web-based interface, the interface would directly access the various software applications (e.g., the provisioning application 810) of the OSS 601 and/or access various ISP-provided registration capabilities. Next, at step S1003, the end-user 811 information is used to determine whether service is offered to the geographic location of the end-user 811. If it is determined that no service is available at step S1003, at step S1005 a decline of service message is sent to the end-user 811, ending the end-user 811 ISP selection process. In one embodiment of the present invention, if service is planned for

that location, an appropriate message is displayed to the end-user 811 at step S1005. In another embodiment of the present invention, if service is not currently available at that location, the system stores the end-user's 811 geographic location information to be used in future network build-out planning or future marketing studies. The system may also use the stored information in conjunction with a sales and marketing lead database capability for future sales activities when network service is expanded or planned to be expanded into that geographic area.

[0066] If, however, it is determined that service is offered at the end-user's 811 geographic location at step S1003, at step S1007 the end-user 811 is presented with a list of available ISPs and information regarding the service offerings of the listed ISPs (e.g., service descriptions, promotions, costs, etc.). The offerings for level of service presented to the end user 811 include, for example, descriptions of characteristics such as downstream and/or upstream throughput characteristics, number of IP addresses and IP address assignment methods, cable modem model options, cable modem rental terms, pricing and duration of contracts, and customer support features. Such information is displayed to the end-user 811, along with contact information for the ISPs (e.g., telephone numbers, e-mail addresses, etc). The end-user at step S1009 then contacts a desired ISP (e.g., via a phone call, e-mail etc.) to set up the services that they desire. Once the end-user has contacted the desired ISP and ordered service, at step S1011 appropriate service parameters are passed to the OSS 601 from the desired ISP via a provisioning interface (e.g., the web portal 802 and/or automated provisioning/installation scheduling interfaces, such as XML-based interfaces, etc.) made available to ISPs. The end-user then is connected to the desired ISP at step S1013.

[0067] Figure 10B illustrates a further embodiment of the present invention used to interface with existing end-user automated registration capabilities of a given ISP to enable,

for example, immediate on-line collection of end-user service subscription information.

According to one embodiment, the end-user 811 is presented with the web interface described above with respect to step S1001, which prompts for end-user geographic location information. Once service availability has been established at step S1003, the end-user 811 is presented with the list of available ISPs at step S1015. However, in this embodiment, at step S1017 the web interface is enhanced to enable the end-user 811 to select the desired ISP and once a selection is made, the end-user 811 is redirected to the registration page of the desired ISP.

[0068] Once the desired ISP has collected the required service parameters from the end-user 811 via the ISP registration page, at step S1011 the service parameters are passed to the OSS 601 via a provisioning interface (e.g., the web portal 802 and/or automated provisioning/installation scheduling interfaces, such as XML-based interfaces, etc.) made available to ISPs. The end-user 811 then is connected to the desired ISP at step S1013.

[0069] In a further embodiment of the present invention, at step S1017 the OSS 601 may also pass the end-user 811 name and address information collected at step S1001 to the desired ISP registration page (i.e., if the desired ISP supports such an automated interface), to avoid forcing the end-user 811 to resubmit information, for example, name and address information, etc., provided at step S1001. Once the end-user 811 has ordered services via the web interface of the desired ISP, at step S1011 the desired ISP in turn passes the appropriate service parameters to the OSS 601 via a provisioning interface (e.g., the web portal 802 and/or automated provisioning/installation scheduling interfaces, such as XML-based interfaces, etc.) made available to ISPs. The end-user 811 then is connected to the desired ISP at step S1013.

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[0070] Figure 10C illustrates a process for use by ISPs not having their own end-user registration capabilities and uses end-user registration technologies provided by the OSS 601 to enable immediate on-line collection of end-user service subscription information. The information is then forwarded to a selected ISP via an electronic method (e.g., XML, FTP, e-mail, rsync Internet protocol, etc.). According to this embodiment, the end-user 811 is presented with the web interface described above with respect to step S1001, which prompts the end-user 811 for geographic location information. Once service availability has been established at step S1003, the end-user 811 is presented with the list of available ISPs in step S1015.

[0071] If a desired ISP has a programmatic interface for end-user qualification (e.g., to determine the credit status, etc., of the end-user 811), the OSS 601 passes the end-user 811 information, such as name and address information, etc., from step S1001 to the qualification form of the desired ISP at step S1017. The desired ISP then performs whatever end-user qualification process they desire at step S1019 and a result is sent to the OSS 601 indicating whether the end-user 811 is qualified. If the SP does not choose to accept the end-user 811, control is transferred back to step S1015 where the list of available ISPs is again presented to the end-user 811 so that an alternate ISP may be selected. This then will launch an appropriate qualification process with the newly selected ISP at steps S1015-S1019.

[0072] If, however, a selected ISP does choose to accept the end-user 811, the OSS 601 interface then presents the end-user 811 with information regarding the service offerings for the selected ISP as step S1021. After the end-user 811 selects a set of services at step S1023, the OSS 601 then presents the end-user an interface for scheduling service installation. Once an installation has been scheduled, the OSS 601 then passes the appropriate service parameters back to the selected ISP at step S1025 via an appropriate electronic interface, such

as an FTP interface, e-mail interface, XML interface, etc., and control is transferred to step S1011. In a further embodiment of the invention, control is transferred directly to step S1013 rather than to step S1011, if an electronic interface exists to the ISP such that service parameters can be received and acknowledged in real-time by the ISP. In this way, direct and immediate population of the appropriate service provisioning information into the OSS 601 is possible.

[0073] Figure 10D illustrates a further embodiment of the present invention, which provides a web-based interface for the end-user 811 into the OSS 601 to enable updates to existing service descriptor information that is displayed to the end-users 811. This embodiment typically applies only to ISPs that do not have the end-user registration capabilities described above. According to this embodiment, the end-user 811 selects a web interface presented by the OSS 601. This interface displays, for example, the current ISP of the end-user 811, services in effect with that ISP, and a list of all possible services available from that ISP at step S1029, after performing an appropriate authentication activity (e.g., entry of end-user name and password, etc.) at step S1027.

[0074] The end-user 811 can then select a different service offering at step S1029, in which case the OSS 601 detects such action at step S1031 and gathers the appropriate service parameters and passes them back to the ISP (steps S1021-S1025). The end-user 811 also has the ability to discontinue their existing ISP account, in which case the OSS 601 detects such action at step S1031 and cancellation information is passed back to the existing ISP. In this case, the OSS 601 presents the initial web-based ISP selection interface described above (e.g., steps S1007, and S1015), so that the end-user 811 will have the opportunity to select services from a different ISP.

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[0075] Figure 10E illustrates a further embodiment of the present invention for simultaneous support of all of the above-noted provisioning processes. For example, if the end-user 811 selects ISP A from the OSS 601 web interface and the ISP A is determined at step S1033 to have full end-user registration capabilities, the OSS 601 redirects the end-user 811 to the ISP web interface (step S1015). If, however, the end-user 811 selects ISP B from the same OSS 601 web interface, and the OSS 601 determines at step S1033 that ISP B has no end-user registration capabilities, the OSS 601 then launches its own end-user registration capabilities on behalf of the ISP B, as described above and passes the end-user 811 selected service parameters back to the ISP B (step S1007).

[0076] In a further embodiment of this invention, the service provider selection process does not require the end user 811 to enter geographic location information. For example, it may be known that a particular end user 811 is in the geographic build-out area of the network if the end-user 811 has been connected to the network for other services (e.g., video or telephony), but not yet authorized for Internet access service on the network. In this scenario, the end user 811 could obtain a cable modem (e.g., through retail purchase, mail delivery by the network operator, etc.) and connect it to the network interface on the end user's 811 premises before a service provider provisions Internet access service. The network could be used for transmitting provisioning information to and from the end user 811 before the end user 811 is provided service from a service provider.

[0077] U.S. Patent Application Serial No. 09/784,075 entitled "SYSTEM, METHOD, AND COMPUTER PROGRAM PRODUCT FOR END-USER SELF-AUTHENTICATION" describes an end-user 811 sign-in process by which the cable modem is originally identified on the network and initial authentication is performed via a user name and password entered into a web page. In this mode, the cable modem is loaded with a very restrictive set of packet

filters prior to successful initial authentication. After successful initial authentication through entering a user name and password into the web page, a less restrictive set of packet filters are applied to the end user's 811 cable modem or applied to the CMTS (edge router). The initial very restrictive set of packet filters only allow the end user 811 to browse pre-defined web pages that are part of the provisioning system. In one embodiment of the present invention, the pre-defined web pages that are part of the provisioning system include the service provider selection web pages. In this embodiment, the service provider selection as described herein may be presented to an end user 811 that is connected to the network with a very restrictive set of packet filters and still allow the end user 811 to select a service provider before the end user 811 has general Internet connectivity. In this example, the service provider selection user interface requests information other than a geographic location, for example, existing account number, user name, etc.

[0078] Figure 11 illustrates a computer system 1101 upon which an embodiment of the present invention may be implemented. The present invention may be implemented on a single such computer system, or a collection of multiple such computer systems. The computer system 1101 includes a bus 1102 or other communication mechanism for communicating information, and a processor 1103 coupled with the bus 1102 for processing the information. The computer system 1101 also includes a main memory 1104, such as a random access memory (RAM) or other dynamic storage device (e.g., dynamic RAM (DRAM), static RAM (SRAM), and synchronous DRAM (SDRAM)), coupled to the bus 1102 for storing information and instructions to be executed by processor 1103. In addition, the main memory 1104 may be used for storing temporary variables or other intermediate information during the execution of instructions by the processor 1103. The computer system 1101 further includes a read only memory (ROM) 1105 or other static storage device (e.g.,

programmable ROM (PROM), erasable PROM (EPROM), and electrically erasable PROM (EEPROM)) coupled to the bus 1102 for storing static information and instructions for the processor 1103.

[0079] The computer system 1101 also includes a disk controller 1106 coupled to the bus 1102 to control one or more storage devices for storing information and instructions, such as a magnetic hard disk 1107, and a removable media drive 1108 (e.g., floppy disk drive, read-only compact disc drive, read/write compact disc drive, compact disc jukebox, tape drive, and removable magneto-optical drive). The storage devices may be added to the computer system 1101 using an appropriate device interface (e.g., small computer system interface (SCSI), integrated device electronics (IDE), enhanced-IDE (E-IDE), direct memory access (DMA), or ultra-DMA).

[0080] The computer system 1101 may also include special purpose logic devices (e.g., application specific integrated circuits (ASICs)) or configurable logic devices (e.g., simple programmable logic devices (SPLDs), complex programmable logic devices (CPLDs), and field programmable gate arrays (FPGAs)).

[0081] The computer system 1101 may also include a display controller 1109 coupled to the bus 1102 to control a display 1110, such as a cathode ray tube (CRT), for displaying information to a computer user. The computer system includes input devices, such as a keyboard 1111 and a pointing device 1112, for interacting with a computer user and providing information to the processor 1103. The pointing device 1112, for example, may be a mouse, a trackball, or a pointing stick for communicating direction information and command selections to the processor 1103 and for controlling cursor movement on the display 1110. In addition, a printer may provide printed listings of the data

structures/information shown in Figures 10 and 11, or any other data stored and/or generated by the computer system 1101.

[0082] The computer system 1101 performs a portion or all of the processing steps of the invention in response to the processor 1103 executing one or more sequences of one or more instructions contained in a memory, such as the main memory 1104. Such instructions may be read into the main memory 1104 from another computer readable medium, such as a hard disk 1107 or a removable media drive 1108. One or more processors in a multi-processing arrangement may also be employed to execute the sequences of instructions contained in main memory 1104. In alternative embodiments, hard-wired circuitry may be used in place of or in combination with software instructions. Thus, embodiments are not limited to any specific combination of hardware circuitry and software.

[0083] As stated above, the computer system 1101 includes at least one computer readable medium or memory for holding instructions programmed according to the teachings of the invention and for containing data structures, tables, records, or other data described herein. Examples of computer readable media are compact discs, hard disks, floppy disks, tape, magneto-optical disks, PROMs (EPROM, EEPROM, flash EPROM), DRAM, SRAM, SDRAM, or any other magnetic medium, compact discs (e.g., CD-ROM), or any other optical medium, punch cards, paper tape, or other physical medium with patterns of holes, a carrier wave (described below), or any other medium from which a computer can read.

[0084] Stored on any one or on a combination of computer readable media, the present invention includes software for controlling the computer system 1101, for driving a device or devices for implementing the invention, and for enabling the computer system 1101 to interact with a human user (e.g., print production personnel). Such software may include, but is not limited to, device drivers, operating systems, development tools, and applications

software. Such computer readable media further includes the computer program product of the present invention for performing all or a portion (if processing is distributed) of the processing performed in implementing the invention.

[0085] The computer code devices of the present invention may be any interpretable or executable code mechanism, including but not limited to scripts, interpretable programs, dynamic link libraries (DLLs), Java classes, and complete executable programs. Moreover, parts of the processing of the present invention may be distributed for better performance, reliability, and/or cost.

[0086] The term "computer readable medium" as used herein refers to any medium that participates in providing instructions to the processor 1103 for execution. A computer readable medium may take many forms, including but not limited to, non-volatile media, volatile media, and transmission media. Non-volatile media includes, for example, optical, magnetic disks, and magneto-optical disks, such as the hard disk 1107 or the removable media drive 1108. Volatile media includes dynamic memory, such as the main memory 1104. Transmission media includes coaxial cables, copper wire and fiber optics, including the wires that make up the bus 1102. Transmission media also may also take the form of acoustic or light waves, such as those generated during radio wave and infrared data communications.

[0087] Various forms of computer readable media may be involved in carrying out one or more sequences of one or more instructions to processor 1103 for execution. For example, the instructions may initially be carried on a magnetic disk of a remote computer. The remote computer can load the instructions for implementing all or a portion of the present invention remotely into a dynamic memory and send the instructions over a telephone line using a modem. A modem local to the computer system 1101 may receive the data on the

telephone line and use an infrared transmitter to convert the data to an infrared signal. An infrared detector coupled to the bus 1102 can receive the data carried in the infrared signal and place the data on the bus 1102. The bus 1102 carries the data to the main memory 1104, from which the processor 1103 retrieves and executes the instructions. The instructions received by the main memory 1104 may optionally be stored on storage device 1107 or 1108 either before or after execution by processor 1103.

[0088] The computer system 1101 also includes a communication interface 1113 coupled to the bus 1102. The communication interface 1113 provides a two-way data communication coupling to a network link 1114 that is connected to, for example, a local area network (LAN) 1115, or to another communications network 1116 such as the Internet. For example, the communication interface 1113 may be a network interface card to attach to any packet switched LAN. As another example, the communication interface 1113 may be an asymmetrical digital subscriber line (ADSL) card, an integrated services digital network (ISDN) card or a modem to provide a data communication connection to a corresponding type of communications line. Wireless links may also be implemented. In any such implementation, the communication interface 1113 sends and receives electrical, electromagnetic or optical signals that carry digital data streams representing various types of information.

[0089] The network link 1114 typically provides data communication through one or more networks to other data devices. For example, the network link 1114 may provide a connection to another computer through a local network 1115 (e.g., a LAN) or through equipment operated by a service provider, which provides communication services through a communications network 1116. In preferred embodiments, the local network 1114 and the communications network 1116 preferably use electrical, electromagnetic, or optical signals

that carry digital data streams. The signals through the various networks and the signals on the network link 1114 and through the communication interface 1113, which carry the digital data to and from the computer system 1101, are exemplary forms of carrier waves transporting the information. The computer system 1101 can transmit and receive data, including program code, through the network(s) 1115 and 1116, the network link 1114 and the communication interface 1113. Moreover, the network link 1114 may provide a connection through a LAN 1115 to a mobile device 1117 such as a personal digital assistant (PDA), laptop computer, or cellular telephone. The LAN communications network 1115 and the communications network 1116 both use electrical, electromagnetic or optical signals that carry digital data streams. The signals through the various networks and the signals on the network link 1114 and through the communication interface 1113, which carry the digital data to and from the system 1101, are exemplary forms of carrier waves transporting the information. The computer system 1101 can transmit notifications and receive data, including program code, through the network(s), the network link 1114 and the communication interface 1113.

[0090] In an HFC open access architecture, the present invention enables an end-user to select a desired Service Provider (SP) via a web-based interface. The present invention, thus, improves the overall SP selection process for the end-user by presenting a single web-based interface in which the end-user can select the SP of choice. This prevents the end-user from being forced to search through the Web, make multiple telephone calls, or read different pieces of literature to do the comparative analysis necessary to make an SP selection. Current HFC open access systems do not allow for an end-user to select among multiple SPs via a single user interface. This invention improves the SP selection process, and thus contributes

to more efficient service selection and activation by enabling the end-user to access a single interface which can be used to evaluate and select a desired SP for broadband services.

[0091] Numerous modifications and variations of the present invention are possible in light of the above teachings. It is therefore to be understood that within the scope of the appended claims, the invention may be practiced otherwise than as specifically described herein.